DATA SHEET

Pure Storage FlashArray//X

Accelerate core applications and provide a modern data experience.

Pure Storage® FlashArray™//X, the world's first 100% all-flash end-to-end NVMe and NVMe-oF array, now optionally includes a storage-class memory boost to address the most demanding enterprise applications performance requirements. FlashArray//X supports a modern data experience, delivering major breakthroughs in speed, simplicity, flexibility, and consolidation. It's intended for everything from departmental to large-scale enterprise shared-storage deployments, high performance, and mission-critical applications.

Maximize results and flexibility for enterprise and cloud-native, web-scale applications, both on-premises and easily connected to the public cloud. Pure's Evergreen™ model means performance, capacity, and features improve over time without disruption. In a world of fast, pervasive networking, ubiquitous flash memory, and an evolving scale-out application architecture, modern approaches to data management have the power to unite both networked and direct-attached storage in a single, shared architecture.

Accelerate Mission-Critical Applications

With latency as low as 150 µs, FlashArray's all-NVME architecture with plug-and-play storage-class memory brings new levels of performance and extreme low latency to mission-critical business applications and databases. Think faster transactions and decisions and more immersive customer experiences.

Hyper-consolidate Your Cloud

NVMe enables the unprecedented performance density required for tier 1, mixed-workload consolidation in a private cloud. FlashArray//X currently offers ultra-dense 18.3TB DirectFlash™ modules. Purity's always-on Quality of Service (QoS) means you can consolidate radically diverse applications without fear of bandwidth or I/O contention.

100% Performance

- 150 µs to 1ms latency
- NVMe and NVMe-oF DirectFlash
- Plug-in storage-class memory

Efficient and Affordable

- Industry-leading 5:1 data reduction, 10:1 total efficiency
- 3.3PB effective in 6U
- Includes all array software

Resilient, Highly Available

- Proven 99.9999% availability
- QoS: Always-on, IOPs and bandwidth limits
- Built-in business continuity and disaster recovery

Simplicity

- AI-driven management and predictive support
- REST API for cloud orchestration

Industry Recognition

- Six-time Gartner Magic Quadrant Leader for storage[1]
- 2019 Medallia Net Promoter Score certified by Owen CX, in the top 1% of B2B companies

Unify Current and Future Applications

Organizations have evolved to run a mix of classic business applications with new, modern web-scale apps. This mix previously required radically different architectures. With FlashArray//X end-to-end NVMe, and available NVMe-oF, everything can run on a single shared architecture with the potential to unite storage-area networks (SANs) and direct-attached storage (DAS). This gives you the performance of DAS, while enabling the efficiency, reliability, and simplicity of modern shared storage.

In addition to FlashArray//X, which is optimized for performance and latency, FlashArray//C provides a capacity-optimized solution that extends FlashArray enterprise data services to tier-2 workloads and easily interoperates with FlashArray//X to provide a consistent experience and set of data services across all block workloads in your data center.

DirectFlash

FlashArray//X moves beyond legacy SSD architectures that are architected to make flash pretend to be a hard disk. DirectFlash within Purity speaks directly to raw NAND with a super-efficient NVMe protocol and leverages NVMe-oF for even faster network speeds between the array and application servers. DirectFlash is implemented in four components:

DirectFlash Software: DirectFlash Software manages array I/O globally for a faster, more efficient architecture. DFS provides detailed I/O scheduling and performance management, making I/Os deterministic and reducing average latency by reducing the number of slow I/Os that often occur in SSD architectures.

DirectFlash Module: DirectFlash Module is a Pure-designed flash module that connects raw flash directly to the FlashArray storage via NVMe. Unlike traditional SSDs that use a flash controller or flash translation layer, DirectFlash Module is primarily raw flash. This design removes performance roadblocks of SSDs used by many legacy storage architectures.

DirectFlash Shelf: Used to add additional NVMe capacity to a FlashArray//X, DirectFlash Shelf is external to the array chassis. Instead, it's connected to the chassis via NVMe-oF protocol, RDMA over converged (RoCE), leveraging 50Gb-per second Ethernet. The shelf maintains the ability to support different sizes of DirectFlash Modules as flash density improves and new forms become available, such as SCM, QLC, and others.

DirectFlash Fabric: DirectFlash Fabric delivers performance close to DAS plus enterprise-class reliability and data services. NVMe-oF enables massive optimization between the storage controllers and host over fast networking. DirectFlash Fabric brings both performance and efficiency gains. Internal application-specific testing with NVMe-oF over RoCE, FlashArray//X achieved:

- Up to 50% latency reduction compared to iSCSI
- Up to 50% greater transactions per second and 35% lower latency compared to DAS
- Up to 20% latency reduction compared to FC
- Up to 400% capacity efficiency
- Up to 25% host CPU offload

PURESTORAGE®

Purity: The Software-defined Heart of FlashArray

Purity for FlashArray delivers rich, enterprise data services; DirectFlash global flash management; and Evergreen™ improvements with every release. Features such as ActiveCluster™ for business continuity and disaster recovery, QoS, vVols, NVMe-oF, Snap to NFS, Purity CloudSnap™, and EncryptReduce are all examples of new features provided over time with non-disruptive Purity upgrades. All Purity storage services, APIs, and advanced data services are built in and included with every array.

Purity Optimize: Purity Optimize with QoS and DirectMemory Cache features, effortlessly delivers consistent application service level agreements and improved database, analytics, and reporting performance. Always-on QoS provides IOP and bandwidth limits to ensure applications get the resources they need. Consolidate radically diverse applications without fear of I/O contention. DirectMemory Cache software automatically refers reads from the array's flash media to onboard DirectMemory Modules with Intel Optane storage-class memory.

Once you non-disruptively add DirectMemory Modules to a new or existing FlashArray//X70[2] or //X90[2], DirectMemory Cache begins working without the hassle of configurations or tuning. You can expect the array to start lowering latency by up to 50% and enhancements of up to 5GB to 6GB of additional throughput for FlashArray workloads, notably online transaction processing (OLTP) and in-memory databases.

Purity Reduce: FlashArray leverages five forms of inline and post-process data reduction, including compression and deduplication. Data reduction is always on and operates at a variable block size, enabling effective reduction across mixed workloads without tuning. Because different kinds of data compress differently, it applies multiple compression algorithms over time and uses machine learning to identify the best compression for your workloads. Data reduction averages an industry-leading 5:1 with a total efficiency of 10:1 (including thin provisioning).

Purity REST APIs: The REST APIs leverage Purity's open platform, cloud connections, and integrations to drive automation with VMware, Microsoft, Amazon Web Services (AWS), and open-source tools such as OpenStack.

Purity Secure: FlashArray meets the ultra-high security standard FIPS 140-2 with validated always-on encryption and provides Pure Rapid Data Locking for added external security protection. It's well-equipped to assist with compliance on new data regulations such as GDPR. EncryptReduce extends encryption beyond the array to the host and includes data reduction to preserve efficiency while providing an end-to-end encryption solution.
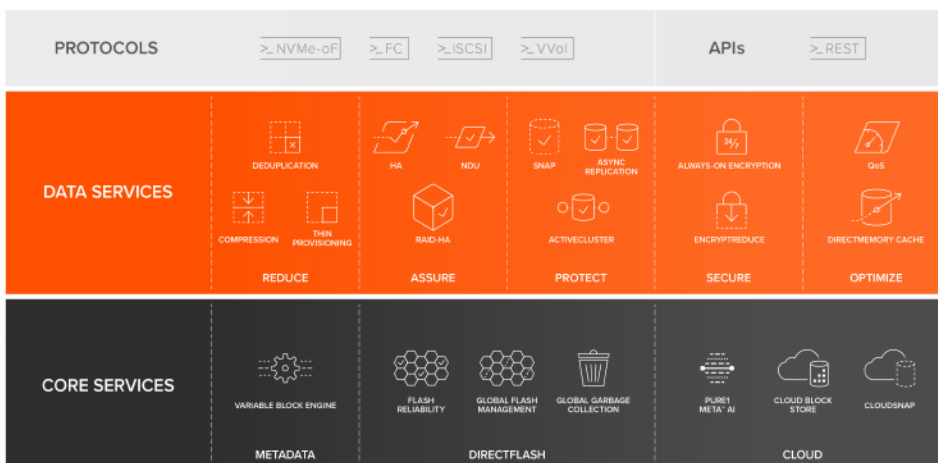
Purity//FlashArray Features[3]

PURESTORAGE®

ActiveCluster: Make Business Continuity Effortless

Make recovery a thing of the past with Purity ActiveCluster, Pure's ultra-simple solution for running applications active-active between two data centers. ActiveCluster's innovative design, including the cloud-based Pure1® Cloud Mediator, enables all data center applications to take advantage of metro-area clustering. ActiveCluster takes just minutes to set up, requires no third site, and is included in the Evergreen subscription at no additional cost.

ActiveCluster has use cases within and between data centers:

- Within a data center it can enable rack-level high-availability clustering of four controllers for maximum resiliency.
- Between data centers, ActiveCluster "stretches" a running volume between two sites, separated by as much as 11ms round-trip latency, without additional configuration. With it, you can read and/or write from both sites at the same time.

Active-active async to third site: Purity also has the ability to take volume(s) that are part of an ActiveCluster relationship and provide asynchronous replication to a third site. The target array makes intelligent and resilient use of asynchronous replication links from both source arrays. The loss of either source array or a replication link is transparent to asynchronous replication and requires no re-baseline: Automatic failover, load balancing, and recovery are built-in.

Simple Setup: Purity ActiveCluster uses the same simple storage management model as the rest of FlashArray. Enabling ActiveCluster involves only one command and four short steps to set up:

1. Connect the arrays
2. Create a stretched pod
3. Create or add a volume
4. Connect the hosts

Comprehensive On-premises and Cloud Backup Options

Get flexible backup and recovery. Pure portable snapshots provide simple, built-in, local and cloud protection for FlashArray. Together, Purity Snapshots, Snap-to-FlashBlade, Snap-to-NFS, and CloudSnap enable free movement of space-efficient copies between FlashArrays, to FlashBlade™, to third-party NFS storage, or to the cloud, respectively. Portable snapshots are cost-efficient: They encapsulate metadata, making them incremental, space-efficient, and self-describing.

Cloud Block Store

Deliver consistent data services, resiliency, and APIs with Cloud Block Store for AWS and FlashArray so you can run applications seamlessly across your on-premises, hybrid-cloud, and cloud environments. Make cloud storage better by leveraging Pure's leading data efficiency, instant space-saving snapshots, and always-on encryption, in the cloud. Pure Cloud Block Store™ provides greater agility and enterprise reliability with its dual-controller architecture and high availability across availability zones for mission-critical applications running in the cloud.

PURESTORAGE®

Simple Cloud-Based Management

Pure1 provides simple cloud-based management and effortless predictive support with full-stack analytics and the AI-driven power of Pure1 Meta™. Pure1 provides a snapshot catalog of all your backups in one place, whether the target is another FlashArray, FlashBlade, NFS target, or public cloud like Amazon S3.

Simplicity by Design, From Day One

FlashArray//X has the power to simplify everything in your storage environment. The hardware, software, and cloud management experience are co-designed to make everything just work. Just a few examples of this simplicity include:

- One box, six cables, no manual required
- Typical 30-minute install (with available professional installation)
- Inclusion of all array software
- Data-reduced end-to-end encryption

- No performance tuning
- APIs for automation
- AI-driven cloud management
- Proactive support

Evergreen Storage

FlashArray operates like SaaS and the cloud. Deploy it once and enjoy a subscription to continuous innovation as you expand and improve performance, capacity, density, and/or features for 10 years or more—all without downtime, performance impact, or data migrations. Pure has engineered compatibility for future technologies directly into the product via the modular, stateless architecture of FlashArray.

- The Right Size capacity guarantee ensures that you start knowing you'll have the effective capacity you need.
- The Capacity Consolidation program keeps your storage modern and dense as you expand.

With Evergreen Storage, you don't have to re-buy terabytes you already own. Keep your storage evergreen, modern, and dense. And always meet your business needs. Pure uniquely offers all of our core solutions either as products (CAPEX) or as services (OPEX) via the Pure as-a-Service portfolio.

Technical Specifications

	Capacity*	Physical
//X50	Up to 663TB / 602.9TiB effective capacity[4] Up to 185TB / 171TiB raw capacity[5]	3U; 868 – 1114 watts (nominal – peak) 95 lbs (43.1 kg) fully loaded; 5.12" x 18.94" x 29.72"
DIRECT FLASH SHELF	Up to 1.9PB effective capacity[4] Up to 512TB / 448.2TiB raw capacity	3U; 460 - 500 watts (nominal – peak) 87.7 lbs (39.8kg) fully loaded; 5.12" x 18.94" x 29.72"

//X Connectivity

Onboard Ports (per controller)
- 2 x 1/10/25Gb Ethernet
- 2 x 1/10/25Gb Ethernet Replication
- 2 x 1Gb Management Ports

Host I/O Cards (3 slots/controller)
- 2-port 10GBase-T Ethernet
- 2-port 1/10/25Gb Ethernet
- 2-port 40Gb Ethernet
- 2-port 25/50Gb NVMe/RoCE
- 2-port 16/32Gb Fibre Channel (NVMe-oF Ready)
- 4-port 16/32Gb Fibre Channel (NVMe-oF Ready)

Additional Resources

- [FlashArray//C Data Sheet](#)
- [Purity Data Sheet](#)
- [Pure1® Data Sheet](#)
- [ActiveCluster Data Sheet](#)
- [DirectMemory Cache Data Sheet](#)

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*   Stated //X specifications are applicable to //X R3 versions.

1   Pure FlashArray has been recognized as a Gartner Magic Quadrant leader for the last six years: Pure was in the leadership quadrant of the Primary Storage Magic Quadrant in 2019 and in the leadership quadrant of the Solid State Arrays Magic Quadrant for the previous five years.

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2   DirectMemory Modules optional for //X70 and //X90 R2 and R3 versions.

3   Not all Purity features supported on all FlashArray models.

4   Effective capacity assumes HA, RAID, and metadata overhead, GB-to-GiB conversion, and includes the benefit of data reduction with always-on inline deduplication, compression, and pattern removal. Average data reduction is calculated at 5-to-1 and does not include thin provisioning.

5.   Array accepts Pure Storage DirectFlash Shelf and/or Pure.